STH# 7636

INSTRUCTIONS

for the

MODEL 982 VACUUM TUBE VOLTMETER

WESTON

INSTRUCTIONS

for the

WESTON MODEL 982

VACUUM TUBE VOLTMETER

(PATENTS PENDING)

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WESTON ELECTRICAL INSTRUMENT CORPORATION

A Subsidiary of Daystrom, Incorporated

NEWARK 12, NEW JERSEY, U. S. A.

F-2578 R2 4-57

Printed in U.S.A.

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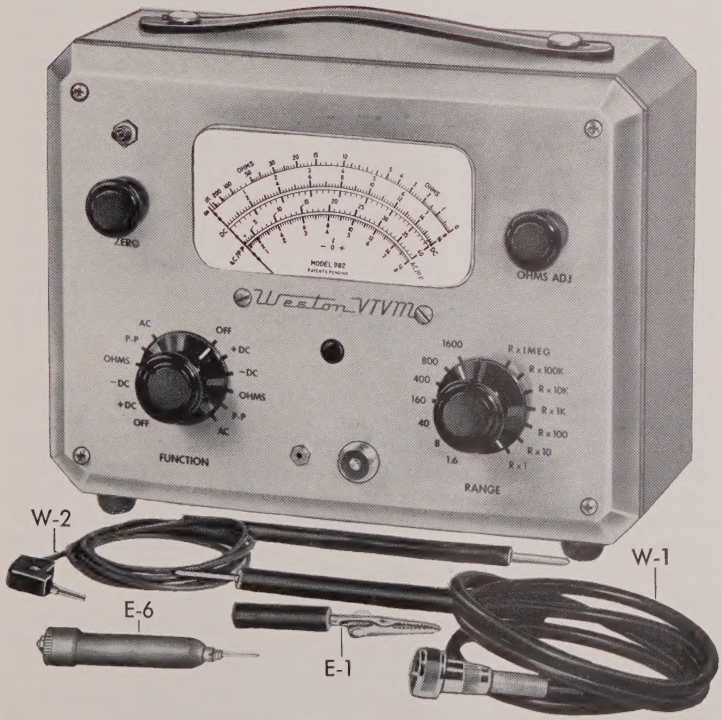


Figure 1. Model 982 and Accessories

GENERAL DESCRIPTION

INTRODUCTION: The Weston Model 982 Vacuum Tube Voltmeter is a completely portable, modern style instrument which incorporates the latest technological advances. (See Figure 1.) It is the first truly battery operated VTVM to achieve the maximum sensitivity and functional use of a 1.6 volt peak-to-peak AC voltage range.

The unit affords complete isolation from spurious response due to stray AC fields and circulating ground currents. The Model 982 was designed specifically with the electronic technicians problems in mind.

The inherent self protection of the meter from overloads and the high input impedance of 10 megohms on DC make this instrument superior to ordinary volt-ohm-milliammeters. The large meter used in this instrument is designed for easy reading and the ranges are selected to be of maximum use for testing and servicing electronic equipment. An unshielded test lead is provided for ground connection and a shielded lead for all voltage and resistance measurements. An isolation adapter is supplied for measurement of DC voltages when AC voltages are also present. A Low Capacitance Adapter is provided with the unit, which makes possible peak-to-peak measurements with a high input impedance of 10 megohms shunted by only 15 micromicrofarads of capacitance.

The electrical circuit is designed to insure long life and dependability. Precision carbon film resistors having 1% accuracy are used for all voltage multipliers. The vacuum tube used is a Raytheon type CK-548-DX which is a special subminiature tube, normally used in hearing aids where long battery life is important. The filament current of this tube is only 10 milliamperes, or only one sixth the current of the smallest flashlight bulb. By means of a special circuit, this one tube is used for all measurements.

Battery life depends largely on the length of time the unit is left on. If normally used eight hours a day, the filament battery will last from three to six months.

The plate battery BT-3 has such a small current drain that the battery will last for one year or more. Its life will depend

more on conditions of temperature and humidity which affect shelf life.

The instrument is normally used in a vertical position, but it may be placed in a horizontal position if desired. The overall accuracy is 3% DC and 5% AC of full scale deflection on sinusoidal waveforms.

RANGES:

1. +DC Voltage (10 Megohms input resistance on all ranges)

   0-1.6, 0-8, 0-40, 0-160, 0-400, 0-800, 0-1600 ..... Read DC arc on meter.

2. −DC Voltage

   Same as +DC except that polarity is reversed without having to switch leads.

3. OHMS

	Read OHMS arc on meter
R x 1	10 ohms center scale
R x 10	100 ohms center scale
R x 100	1,000 ohms center scale
R x 1K	10,000 ohms center scale
R x 10K	100,000 ohms center scale
R x 100K	1 megohm center scale
R x 1 MEG	10 megohms center scale

4. AC Voltage (2.83 megohms input resistance)

   0-1.6, 0-8, 0-40, 0-160, 0-400, 0-800, 0-1600* ..... Read AC/PP arc on meter.

   *Do not use beyond 1200 volts.

   For frequencies above 1500 cycles, use the peak-to-peak ranges.

5. P-P (Peak-to-Peak) Voltage; 1 megohm input resistance; 60 mmf input capacitance; 120 mmf input capacitance with shielded cable.

0-1.6	0-400*	Read AC/PP arc on meter.
0-8	0-800*	
0-40	0-1600*	
0-160		

*For frequencies above 2,000 cycles use the Low Capacitance Adapter (E-6) and select any of the lower ranges and multiply by 10. See pages 10 and 11 for frequency response.

6. P-P (Peak-to-Peak) Voltage with Low Capacitance Adapter (E-6); 10 Megohms input resistance; 15 mmf input capacitance.

0-16	0-400	Peak-To-Peak with Low Capacitance Adapter (E-6).
0-80	0-1600	

NOTE: Do not use beyond 1600 volts Peak-to-Peak. For frequency response see pages 10 and 11.

DC VOLTAGE MEASUREMENTS: The input resistance of 10 megohms is due to the input grid divider network from which a fraction of the input signal operates a cathode follower. This unbalances a bridge network and causes the indicating meter to read. Switching to —DC reverses the meter connection so that the readings of negative voltage cause the meter to swing up scale.

DC RESISTANCE MEASUREMENTS: A single 1.5 volt battery is used in series with the input resistance divider to provide a signal to the cathode follower which in turn actuates the meter. Resistance is read directly on the OHMS arc.

AC AND PEAK-TO-PEAK VOLTAGE MEASUREMENTS: AC measurements including PEAK-TO-PEAK are made by a special reflex circuit. The input capacity-resistance divider has a constant 1 megohm input resistance for peak-to-peak with an added series attenuator to give a 2.83 megohm input resistance for AC. The signal from the input divider goes to the cathode follower. The AC cathode follower output then goes to the germanium diode peak-to-peak rectifier. The output of the germanium rectifier is a DC voltage which is re-introduced to the grid of the cathode follower, and in turn, the DC output is used to operate the indicating meter.

PEAK-TO-PEAK VOLTAGE MEASUREMENTS: The method of measurement described in the previous paragraph will indicate true peak-to-peak with all types of waveforms whether they are positive pulses, negative pulses, sine wave, saw tooth, square wave or any waveform. The frequency response on sine wave is good to 300,000 cycles. On waveforms other than sine wave, the frequency response is such that fundamentals of 20 to 16,000 cycles per second and harmonics to 300,000 cycles or pulses of 5 microsecond width can be measured. If the repetition rate and pulse width are both sufficiently low a correction is required as indicated in the graph on page 23.

LOW CAPACITANCE ADAPTER (E-6): On peak-to-peak measurements, the Low Capacitance Adapter can be used with the four lowest voltage ranges when it is desired to reduce circuit loading.

It MUST be utilized when measuring peak-to-peak voltage values in excess of 160 volts having a harmonic content exceeding 2,000 cycles per second since the 400, 800, 1600 volt ranges are not frequency compensated.

In most cases in circuits where peak-to-peak measurements are made, the typical shunt loading of 1 megohm and 100 micromicrofarads seriously affected the value of the voltage present. Unlike other VTVM's, the Model 982 is capable of being used with a 10-1 capacitance adapter which makes the input impedance 10 megohms shunted only by 15 micromicrofarads capacitance.

OPERATING INSTRUCTIONS

CAUTION: When making high voltage measurements, as a protection to yourself, form the habit of turning off all power to the circuit under test. Connect the test leads at the desired points in the circuit and then turn power on to take the reading. Turn off the power before disconnecting the test leads.

Always remember that the pin jack on the Model 982 is directly connected to the metal panel and should always be connected to the ground or chassis. Never reverse the test leads to measure a potential of the opposite polarity. Use the reversing switch provided for this purpose on the panel.

When the instrument is not to be used for an hour or more, turn off to conserve batteries.

ZERO ADJUSTMENT: With the instrument turned off, check to see that the pointer indicates zero. If the pointer is off zero, mechanically adjust the black screw located just below the meter (See Figure 1, Page 3).

Then turn the instrument on and electrically adjust the ZERO control to the left of the meter until the meter pointer indicates zero.

WARM-UP TIME: The Model 982 is ready for use seconds after turning it on. For AC and Peak to Peak, the meter may initially read off scale. Momentarily, press the ZERO reset button and the pointer will rapidly come down to zero.

DC VOLTAGE MEASUREMENTS:

1. Rotate FUNCTION switch to +DC VOLTS.
2. Rotate RANGE switch to 1600 VOLT position.
   A lower range may be used for smaller voltages.
   If in doubt start with the highest range.
3. Connect TEST LEADS to instrument.
4. Set ZERO control so meter pointer lies directly over left hand zero on scale.
5. Connect UNSHIELDED TEST PROD to ground side or low potential side of circuit being measured.
6. Connect SHIELDED TEST PROD to active side or high potential side of circuit being measured.
7. Turn on POWER to circuit being tested. If pointer swings down scale, turn FUNCTION switch to —DC VOLTS.
8. Read VOLTAGE on arc marked DC.
   For 1.6 volt range read 0-16 scale and divide by 10.
   For 8 and 40 volt ranges read scales directly.
   For 160, 400 and 800 volt ranges read scales and multiply by 10.
   For 1600 volt range read 0-16 scale and multiply by 100.

   NOTE: A DC isolation adapter is supplied and can be connected to the shielded lead for making DC measurements in the presence of AC voltage.

DC RESISTANCE MEASUREMENTS:

CAUTION: Be sure the power to the equipment under test is turned off before making resistance measurements to avoid damage to the meter circuit.

1. Rotate FUNCTION switch to OHMS.
2. Rotate RANGE switch to R x 1 MEG.
3. Connect TEST LEADS to instrument.
4. Set ZERO control so meter pointer lies directly over left hand zero on scale.
5. Short TEST LEADS together and adjust OHM ADJ control so meter pointer lies directly over right hand zero on top scale.
6. Connect TEST LEADS across resistance or portion of circuit being measured.
7. Read RESISTANCE on OHMS arc.
   For R x 1 MEG range, read scale and multiply by 1,000,000.
   For best accuracy select a range which gives a reading between 3 and 30 on the ohms scale.
   For R x 100K range, read scale and multiply by 100,000.
   For R x 10K range, read scale and multiply by 10,000.
   For R x 1K range, read scale and multiply by 1,000.
   For R x 100 range, read scale and multiply by 100.
   For R x 10 range, read scale and multiply by 10.
   For R x 1 range, read scale of resistance directly.
   For R x 1 range, repeat step (5) for best results.

CAUTION: Do not leave the FUNCTION switch in the OHMS position when the instrument is not in use. The test leads may accidentally be shorted together and cause a current drain through the ohmmeter battery. It may also damage the instrument if the leads are accidently connected across an external voltage source. This is especially true of the low resistance ranges which will tend to draw the greatest currents.

AC VOLTAGE MEASUREMENTS:

1. Rotate FUNCTION switch to AC VOLTS.

2. Rotate RANGE switch to 1,600 VOLT position. A lower range may be used for smaller voltages. If in doubt, start with the highest range.
3. Connect TEST LEADS to instrument.
4. Set ZERO control so meter pointer lies directly over left hand zero on scale.
5. Connect UNSHIELDED TEST PROD to ground side or low potential side of circuit being measured.
6. Connect SHIELDED TEST PROD to active side or high potential side of circuit being measured.
7. Turn on POWER to circuit being tested.
8. Read VOLTAGE on the arc marked AC PP.

   For 1.6 volt range, read 0-16 scale and divide by 10.

   For the 8 and 40 volt ranges, read scale directly.

   For the 160, 400 and 800 volt ranges, read scales and multiply by 10.

   For the 1,600 volt range, read the 0-16 scale and multiply by 100.

   NOTE: For frequencies above 1500 cycles refer to "Frequency response and selection of range functions" below.

FREQUENCY RESPONSE AND SELECTION OF RANGE FUNCTIONS:

The use and selection of the Low Capacitance Adapter and the AC and Peak-To-Peak functions must be understood thoroughly.

AC VOLTS: Use the AC position on the FUNCTION Switch for measuring sine waves between 20 and 1500 cycles per second to obtain RMS readings. Do not use beyond 1200 volts rms.

PEAK-TO-PEAK VOLTS: Use the P-P position on the FUNCTION Switch for measuring peak-to-peak values of non-sinusoidal waveforms. 1.6, 8, 40, 160 volt ranges have a band-width of from 20 to 300,000 cycles per second. The 400, 800 and 1600 volt ranges have a response from 20 to 2,000 cycles per second.

For voltage measurements beyond 160 volts with frequency components to 300,000 cycles per second, the Low Capacitance Adapter must be employed.

LOW CAPACITANCE ADAPTER: This accessory is needed when low circuit loading is of prime importance; or when peak-to-peak voltages in excess of 160 have frequency components above 4000 cycles. Use the P-P position on the FUNCTION Switch with only the 1.6, 8, 40, or 160 volt ranges and multiply by 10. The frequency characteristic is 20 to 300,000 cycles per second. Do not use with the 400, 800, 1600 volt ranges as these positions are not frequency compensated.

APPLICATION: For audio frequency response, sine waves up to 300,000 cycles/second, non-sinusoidal waveforms having harmonic components up to 300,000 cycles/second, and for all TV peak-to-peak measurements, rotate the FUNCTION Switch to P-P and use only the 1.6, 8, 40, or 160 volt ranges. For lower circuit loading or for measuring peak-to-peak voltages above 160, use the Low Capacitance Adapter.

NOTE: To obtain rms values from a peak-to-peak reading of a sine wave, divide the reading by 2.8.

FREQ. RANGE	FUNCTION SWITCH	RANGE SWITCH	LOW CAP. ADAPTER	METER INDICATES	REMARKS
20 cycles to 1.5K cycles	AC	1.6, 8, 40, 160, 400, 800, 1600	NEVER	RMS	Power line and low audio freq. measurements. Sine waveform.
20 cycles to 2K cycles	P-P	1.6, 8, 40, 160, 400, 800, 1600	——	P-P	Non-sinusoidal or sine waveforms.
20 cycles to 300K cycles	P-P	1.6, 8, 40, 160	——	P-P	Non-sinusoidal or sine waveforms, Audio response.
20 cycles to 300K cycles	P-P	1.6, 8, 40, 160	YES	P-P (Multiply ranges by 10)	Non-sinusoidal or sine waveforms, all TV Peak-to-Peak measurements.

THEORY OF OPERATION

+DC VOLTS: The DC volts circuit shown in figure 2 can best be described by making use of two analogies. Consider a Wheatstone Bridge shown in figure 3 as the first analogy.

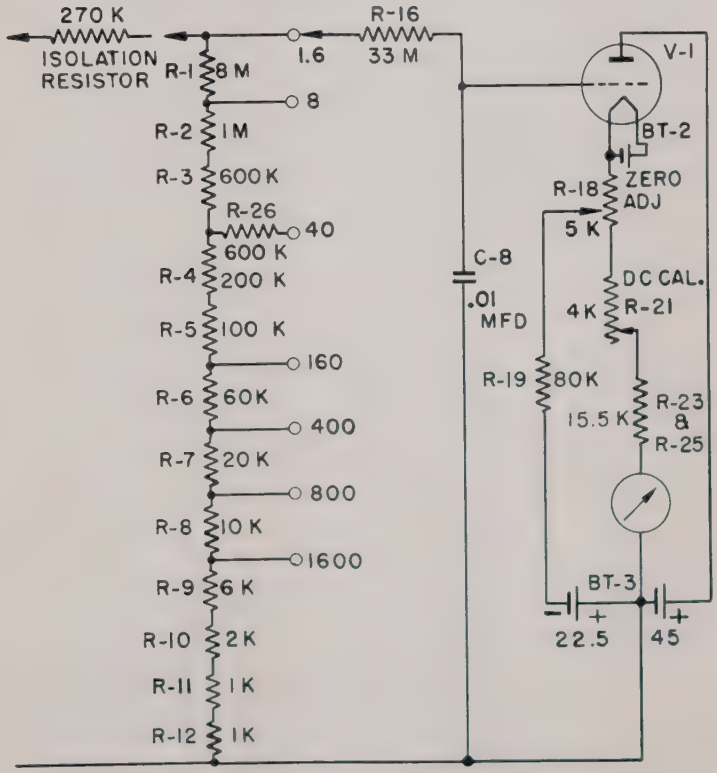


Figure 2. DC Volts Circuit

By replacing two of the bridge arms with the tapped battery BT-3, the modified bridge shown in figure 4 is the result. Now replace a third arm of the bridge by a vacuum tube V-1 as shown in figure 5, and adjust the zero adjuster R-18 until the effective resistance of the tube is equal to R-19. The bridge is balanced and no current flows through the meter.

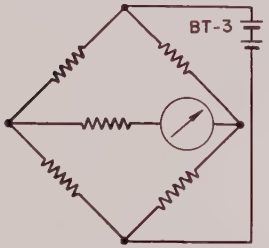


Figure 3. Bridge Analogy

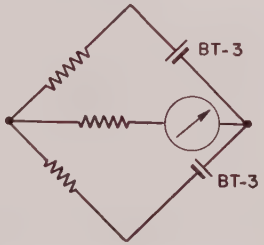


Figure 4. Modified Bridge Analogy

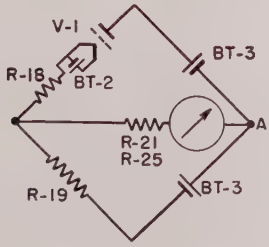


Figure 5. Actual Circuit

With the bridge now in balance, if a voltage is impressed between the grid of tube V-1 and point A, the effective resistance of the tube changes and the bridge becomes unbalanced, thus causing an indication on the meter. Whenever the grid of tube V-1 goes positive, the tube conducts more easily and its resistance is low. If the grid goes negative, the conductivity of the tube is low and its resistance is high. Therefore, the tube functions like a variable resistor.

The second analogy is the cathode follower shown in figure 6. The tapped battery BT-3 is arranged so that the current flow through the plate circuit opposes the current flow through the bucking circuit. The zero adjuster R-18 is adjusted until both currents are equal. A constant 10 megohms input resistance is obtained from an input grid divider network, consisting of resistors R-1 to R-12 shown in figure 2. A fraction of this input signal operates the cathode follower. When the grid of V-1 goes positive, the tube conducts more easily and the flow of plate current becomes larger than the flow of current through R-19. The end result is a meter indication in the positive direction. Capacitor C-8 and resistor R-16 eliminate the possibility of electrostatic charges from reaching the grid of V-1.

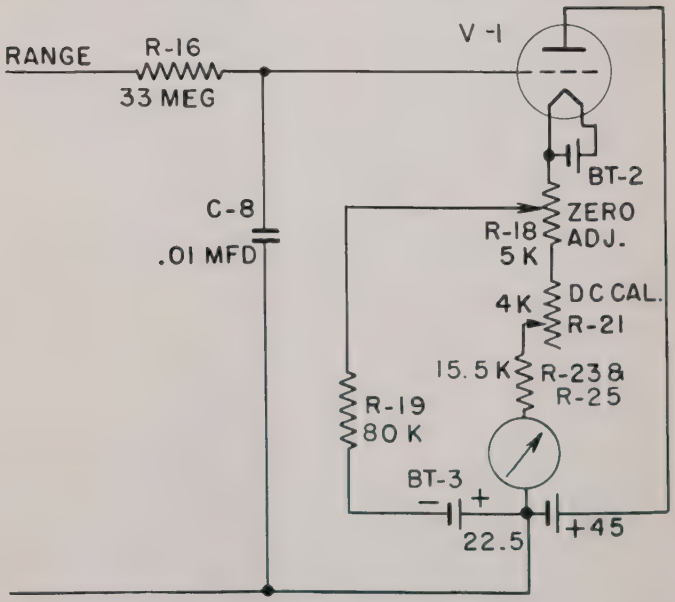


Figure 6. Cathode Follower Circuit

—DC VOLTS: The polarity of the grid voltage of tube V-1 can be reversed if the function switch S-2 is rotated to its —DC position. Therefore, if the grid of V-1 goes negative, the conductivity of the tube is low and the flow of current through R-19 becomes greater than the flow of plate current. Since the meter terminal connections are reversed by switch S-2, the resulting current still causes the meter pointer to swing upscale, and enables readings of negative voltages.

OHMS CIRCUIT: The series ohmmeter circuit is shown in figure 7. A single 1.5 volt battery BT-1 is connected in series with an input resistance divider, consisting of resistors: R-1 to R-14 inclusive. This arrangement provides a signal to the cathode follower which in turn actuates the meter. Resistance is read directly on the ohms arc of the meter. The zero adjuster compensates for voltage variations in battery BT-3 and lines up the meter pointer with zero-left on the AC and DC scales. The ohms adjuster compensates for voltage variation in ohms battery BT-1 and lines up the meter pointer with zero-right on the ohmmeter scale.

PEAK-TO-PEAK VOLTS: The PEAK-TO-PEAK AC VOLTMETER has a constant 1 megohm input resistance shunted by 50 micromicrofarads. The input cable has an additional shunt capacitance of 60 mmf. A voltage is applied through the input divider, sending an AC signal to the grid of the tube V-1. The conventional DC current flow at the plate circuit, coming from battery BT-3, is modulated by the AC grid voltage and causes an AC voltage to appear at the cathode. The AC voltage at the cathode is rectified by passing through CR-1 and CR-2 germanium rectifiers and produces across capacitor C-7 a DC voltage which is equal to the peak-to-peak value of the AC voltage. The capacitor voltage is re-introduced to the grid of the tube as DC, thus creating a DC unbalance at the cathode follower which in turn results in a meter indication.

The input divider consists of resistors R-3 to R-12 and capacitors C-2, C-3, C-4 and C-10 (See Figure 8.). The resistors serve as dividers at frequencies below 2,000 cycles and the capacitors serve as dividers at frequencies above 2,000 cycles for the 8 and 40 volt ranges.

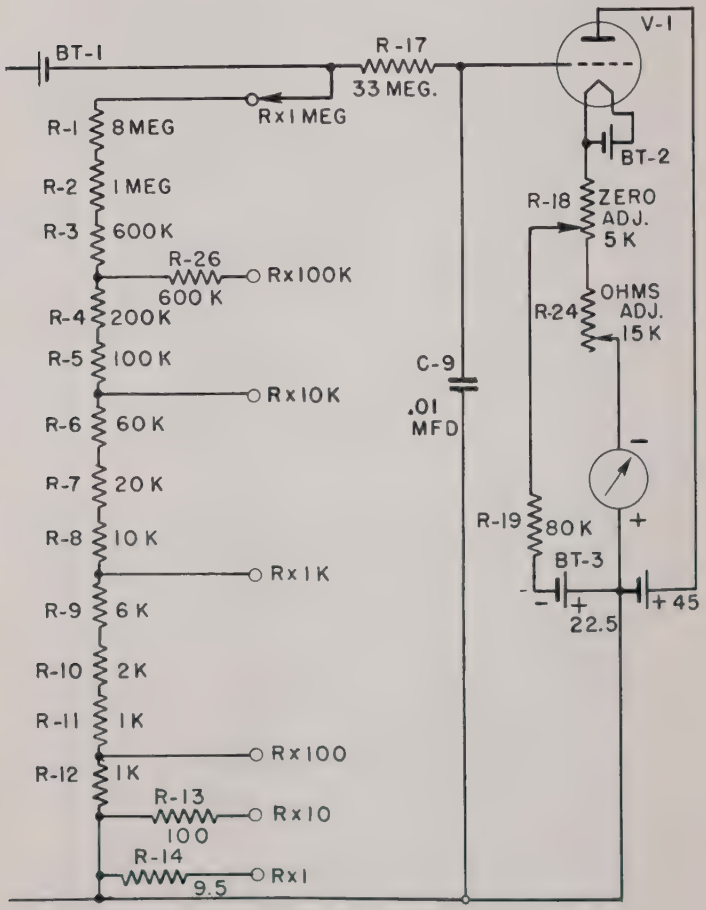


Figure 7. Ohmmeter Circuit

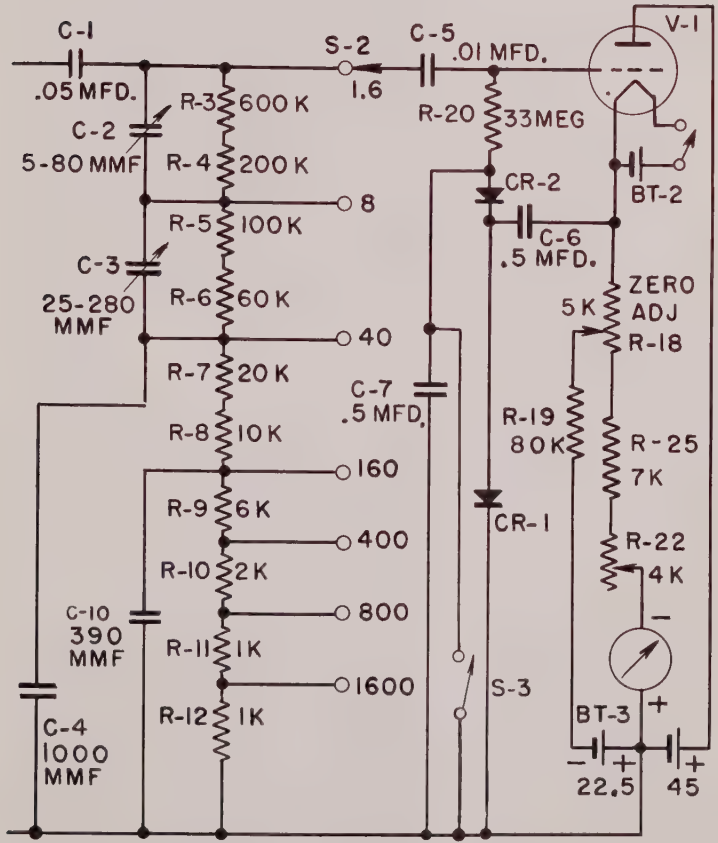


Figure 8. Peak-to-Peak Volts Circuits

AC VOLTAGE: The AC is basically a peak-to-peak method. With an added attenuator consisting of a resistor R-15, the input resistance increases to 2.83 megohms which reduces the sensitivity to give correct RMS AC readings.

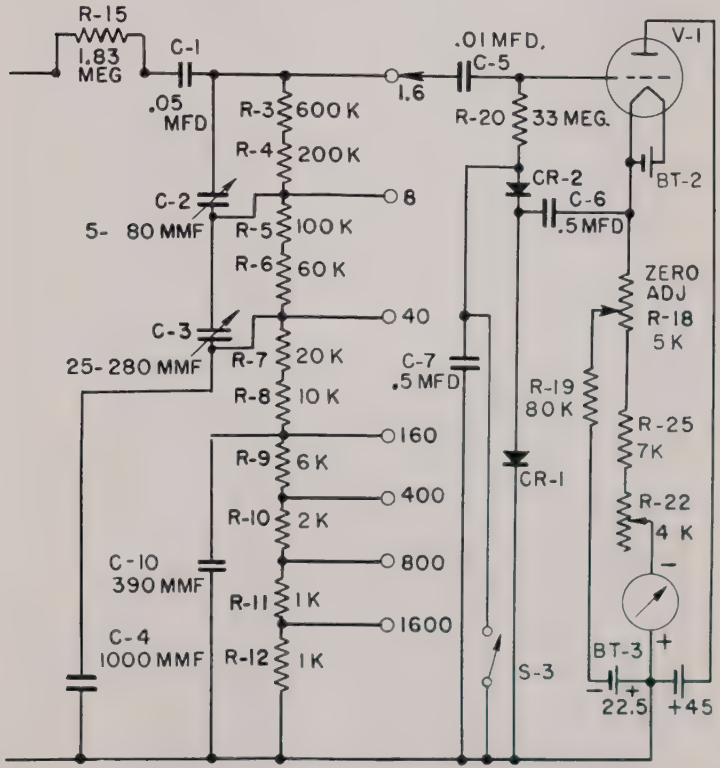


Figure 9. AC Volts Circuit

MAINTENANCE

PRECAUTIONS: Handle instrument carefully to insure lifetime accurate operation. The meter pointer is the most delicate and should be kept from damage through improper handling. Shock or any rough treatment may result in meter inaccuracy. The meter is electronically protected against burnout, but proper range selection is important to prevent damage to other parts of the instrument. When instrument is not in use, the function switch should be in the OFF position.

Do not connect the instrument to an energized circuit when trying to measure resistance. The ohmmeter ranges are intended to operate on 1.5 volts DC, not 115 volts AC, nor 400 volts DC.

If the instrument is to be stored for a prolonged period of time, remove the batteries to prevent corrosion damage. When replacing the 1.5 volt batteries, use a similar leakproof type for maximum protection from corrosion.

PARTS AND REPLACEMENT: Figure 14, page 25 shows the etched circuit panel view of the instrument and the location of all parts. To open the rear panel, remove the four corner screws on the back. This will make all components visible and make the batteries accessable for replacement.

If a component has become damaged, identify the part using figure 14 and the parts list.

Replacement of parts will be made easier if the case is removed by taking out the four (4) corner screws on the front. Most components can be replaced by clipping the leads off close to the body of the component, leaving two pigtails sticking up from the etched circuit plate. The replacement part can then be soldered between the two pigtails. Be careful to use rosin core solder and a moderate amount of heat. Too little heat can cause a cold soldered joint, and excessive heat will weaken the etched circuit.

If it is necessary to replace major items such as the meter or switches, then remove the four knobs, remove four ⅜ inch nuts and unsolder the wire at the center of the shielded con-

nector on the panel. To remove the meter, unsolder the two connecting wires from the etched circuit and remove the two screws from the front panel. Be careful to hold the meter cover and base together when removing the screws.

Switch frames can each be taken off by removing two screws. The rotors can then be removed by loosening the clip fastener.

BATTERY INSPECTION AND REPLACEMENT:

1. Inspection

   A 45 volt battery BT-3 and two 1.5 volt batteries BT-1 and BT-2 will wear out over a period of time. The internal battery resistance will gradually increase and will be evident when the ZERO control and the OHMS ADJ control lose effectiveness.

   The 45 volt battery has such a small load upon it, that it will outlast several filament batteries. The first thing to do is replace the filament battery BT-2 by the spare battery which is carried in a clip on the back plate. The back plate can be taken off by simply removing the four (4) corner screws on the back.

   With a fresh filament battery in place, the instrument can measure its own 45 volt battery BT-3 as follows: Set the FUNCTION switch to +DC and the RANGE switch to 40 volts. Place the shielded test lead on the +45 terminal of the battery BT-3. The voltage reading should be 22.5 volts for a normal battery and can be allowed to fall to about 19 volts without affecting accuracy. If the voltage is below 19 volts the battery should be replaced.

   The 1.5 volt OHMS battery should be replaced when the OHMS ADJ control can no longer bring the meter pointer to full scale with the test leads shorted on the R x 1 range.

2. Replacement

   With exception of battery installation, the Model 982 is received from the factory ready for immediate use.

The batteries are packed separately to insure fresh batteries, however, they are easily installed in the following manner:

a. Remove the four screws that attach the back panel to the instrument case.
b. Turn the back panel over and set it aside, being careful not to strain the battery leads.
c. Unwrap the batteries and insert two of the 1.5 volt units in the two clip receptacles located inside the case.

NOTE: When inserting these batteries be sure to observe the polarity marked on the etched circuit panel alongside the battery clips.

d. Insert the spare 1.5 volt battery in the clip receptacle located on the back panel.
e. Loosen the two battery bracket screws on the back panel. Slide the 45 volt battery under the bracket and tighten the screws.
f. Unscrew the three Bakelite terminals on the top of the 45 volt battery and connect the red, white and blue leads coming from the etched circuit to the terminals indicated in figure 14, page 25.

APPLICATIONS

PEAK-TO-PEAK WAVEFORMS: A great number of AC voltages which appear in TV sets are not of conventional sine-wave form. Special waveforms such as sawtooth waves, square waves, positive pulses and negative pulses would give different readings on meters which respond to average or rms values. The best way to specify the magnitude of such voltages is by a peak-to-peak measurement. The peak-to-peak voltage corresponds to the height of the waveform as it would appear on a calibrated oscilloscope. Although an oscilloscope could be used to measure these voltages, the Vacuum Tube Voltmeter requires less settings and is more portable, faster and easier to use. The Model 982 meter could also be used to calibrate an oscilloscope when one is available.

Typical waveforms which can be measured are shown in Figures 10, 11 and 12.

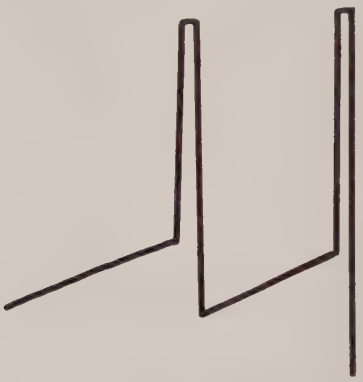


Figure 10. Vertical Sync Amplifier 60 cps

Figure 11. Horizontal Oscillator (Modified negative pulse) 15,750 cps

Figure 12. Horizontal Drive (Sawtooth) 15,750 cps

Note that in some cases the capacitive loading of the Vacuum Tube Voltmeter can cause de-tuning of circuits. This can be minimized by using the Low Capacitance Adapter (E-6). This probe should be connected between the tip of the shielded test lead and the point in the circuit being tested. The probe will be particularly useful on the 1.6, 8, 40 and 160 volt positions, giving ranges of 16, 80, 400 and 1600 volt peak-to-peak with wide frequency response of 20 cycles to 300,000 cycles. Correction curves for narrow pulse waveforms are shown in figure 13.

AGC VOLTAGE MEASUREMENTS: The Model 982 VTVM is used to measure Automatic Gain Control circuits which develop small DC voltage values across a high impedance circuit. With the range switch in the 8 volt position and the function switch on +DC, the extremely high input impedance of 10 megohms is more than enough to prevent overloading of the circuit. Even with the range switch on 1.6 volts the input impedance is still 10 megohms, and readings are still reliable.

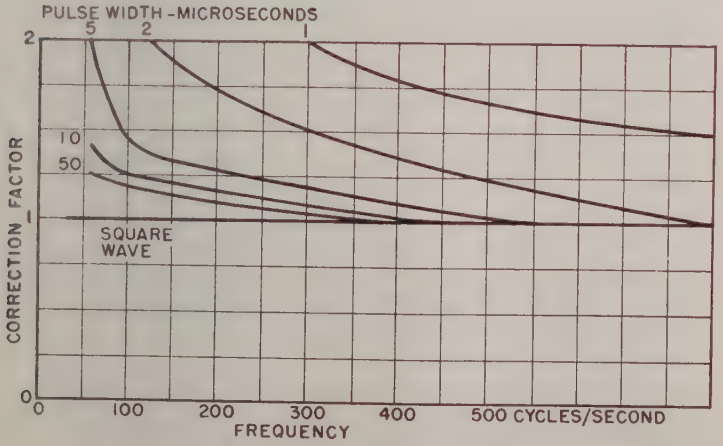


Figure 13. Correction Curves for Narrow Pulse Waveforms.

HIGH MU PLATE VOLTAGE: High MU tubes require a higher impedance in their plate circuit than is necessary for operation of tubes with lower amplification factors. When used as a DC VTVM, the Model 982 provides more accurate voltage readings than conventional voltmeters, since it is designed to minimize loading effect on the plate circuit. Ordinary voltmeters load the plate circuit to the extent that it modifies the voltage which it reads.

BIAS VOLTAGE MEASUREMENTS: Grid bias voltages have small values and are connected across high impedance circuits. The advantages of a vacuum tube voltmeter are well known. Any range in this vacuum tube voltmeter can be used to measure the bias voltage because the high input impedance of 10 megohms is constant for all ranges. The loading effect on the 1.6 range is as small as 1/16 of a microampere. Improper bias due to leaky coupling capacitors can easily be detected using the Model 982.

IF AMPLIFIER ALIGNMENT OF FM AND TV SETS: In a stagger tuned IF amplifier system, badly mistuned circuits are easily noticed by a lack of over-all response. Preliminary corrective alignment can be accomplished using a signal generator and a Model 982 Vacuum Tube Voltmeter.

The signal generator can be set to one frequency at a time and adjustments made to the particular slug which controls or rejects that frequency.

The Model 982 should be set to AC when using an AM modulated signal generator, or if modulation is not used, then the DC voltage across the detector can be measured using the +DC or −DC positions, depending on the polarity of detector output. The DC isolation adapter should be used in this case to prevent de-tuning the detector.

For setting trap frequencies, the AM modulated signal generator could be used, and the Model 982 set to its most sensitive range which is the 1.6 volts peak-to-peak range. Note that this corresponds to about 0.566 volts RMS and gives three times the normal AC sensitivity.

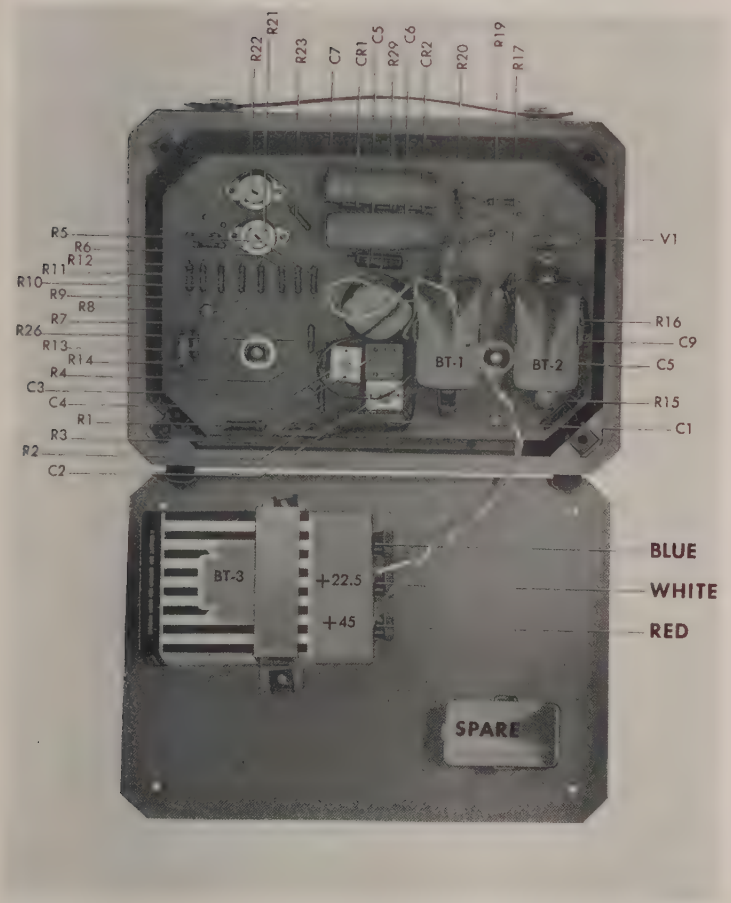


Figure 14. Model 982 Internal View

REPLACEMENT PARTS LIST FOR MODEL 982

Circuit Symbol	Description	Weston Part No.
C-1	CAPACITOR, FIXED, PAPER: tubular; 0.05 mfd; +30% −10%; 600 vdcw.	ND-26825
C-2	CAPACITOR, VARIABLE: mica trimmer; 5-80 mmf.	ND-27756
C-3	CAPACITOR, VARIABLE: mica trimmer; 25-280 mmf.	ND-27757
C-4	CAPACITOR, FIXED, MICA: 1,000 mmf; ±3%.	ND-27803
C-5	CAPACITOR, FIXED, PAPER: tubular; 0.01 mfd; ±20%; 400 vdcw.	ND-20196
C-6	CAPACITOR, FIXED, PAPER: tubular; 0.5 mfd; ±20%; 400 vdcw.	ND-27587
C-7	Same as C-6.	
C-8	CAPACITOR, FIXED, CERAMIC: disc; 0.01 mfd; ±20%; 500 vdcw.	ND-24848
C-9	Same as C-8.	
C-10	CAPACITOR, FIXED, CERAMIC; tubular; 390 mmf; ±10%.	ND-28549
E-1	ADAPTER ASSEMBLY: (DC isolation).	153009
E-2	KNOB: 15/16 in. dia; 5/8 in. wide; no. 8-32 1/4 in. long; Tenite 11 plastic; Allen socket set screw.	150651
E-3	Same as E-2.	
E-4	KNOB ASSEMBLY: 1 1/8 in. dia; skirted; function; with set screw.	153000
E-5	KNOB ASSEMBLY: 1 1/8 in. dia; skirted; range; with set screw.	153001
E-6	ADAPTER ASSEMBLY: (Low Capacitance)	153175
J-1	CONNECTOR, RECEPTACLE: male; single contact; microphone plug.	ND-27798
J-2	CONNECTOR, RECEPTACLE: female; single contact; microphone jack.	ND-27788
R-1	RESISTOR, FIXED, COMPOSITION: 8 megohms; ±1%; 1 watt.	ND-27754

Continued on next page.

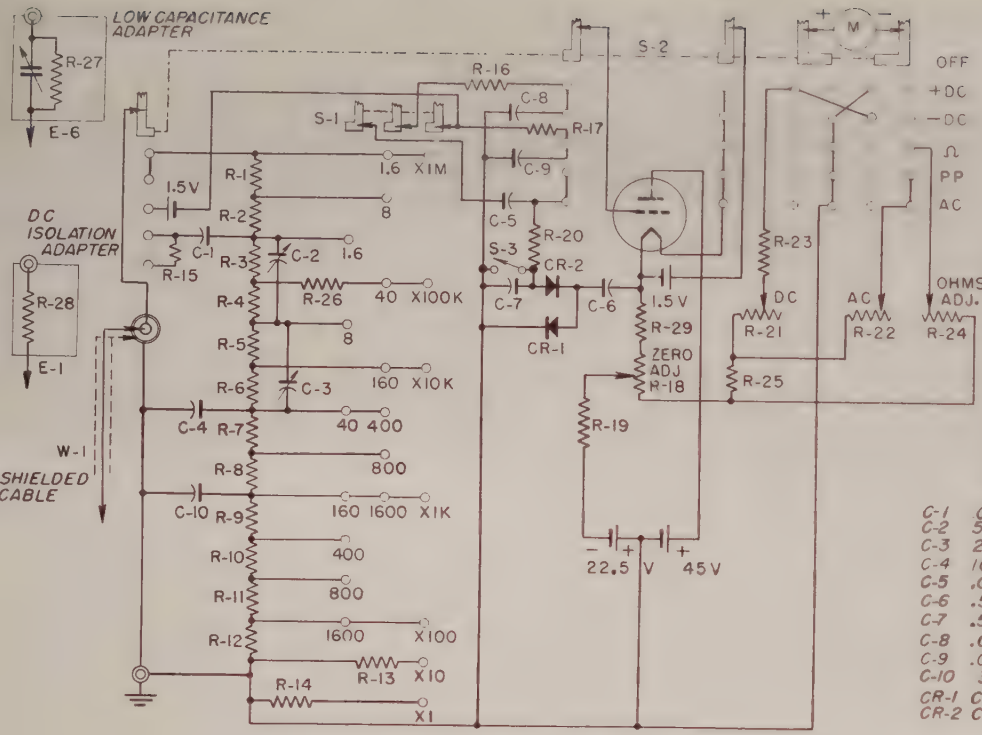
REPLACEMENT PARTS LIST FOR MODEL 982 (Con't)

Circuit Symbol	Description	Weston Part No.
R-2	RESISTOR, FIXED, COMPOSITION: 1 megohm; ±1%; ½ watt.	ND-27752
R-3	RESISTOR, FIXED, COMPOSITION: 600,000 ohms; ±1%; ½ watt.	ND-27751
R-4	RESISTOR, FIXED, COMPOSITION: 200,000 ohms; ±1%; ½ watt.	ND-27334
R-5	RESISTOR, FIXED, COMPOSITION: 100,000 ohms; ±1%; ½ watt.	ND-27750
R-6	RESISTOR, FIXED, COMPOSITION: 60,000 ohms; ±1%; ½ watt.	ND-27749
R-7	RESISTOR, FIXED, COMPOSITION: 20,000 ohms; ±1%; ½ watt.	ND-27748
R-8	RESISTOR, FIXED, COMPOSITION: 10,000 ohms; ±1%; ½ watt.	ND-27747
R-9	RESISTOR, FIXED, COMPOSITION: 6,000 ohms; ±1%; ½ watt.	ND-27745
R-10	RESISTOR, FIXED, COMPOSITION: 2,000 ohms; ±1%; ½ watt.	ND-27827
R-11	RESISTOR, FIXED, COMPOSITION: 1,000 ohms; ±1%; ½ watt.	ND-27298
R-12	Same as R-11.	
R-13	RESISTOR, FIXED, COMPOSITION: 100 ohms; ±1%; ½ watt.	ND-27746
R-14	RESISTOR, FIXED, WIRE-WOUND: 9.5 ohms; ±1%; ½ watt.	150591
R-15	RESISTOR, FIXED, COMPOSITION: 1.83 megohms; ±1%; 1 watt.	ND-27753
R-16	RESISTOR, FIXED, COMPOSITION: 33 megohms; ±20%; ½ watt.	ND-27923
R-17	Same as R-16.	

Continued on next page.

REPLACEMENT PARTS LIST FOR MODEL 982 (Con't)

Circuit Symbol	Description	Weston Part No.
R-18	RESISTOR, VARIABLE; wire-wound; 5,000 ohms; ±10%; 2 watts; S-taper.	ND-28245
R-19	RESISTOR, FIXED, COMPOSITION: 80,000 ohms ±1% ½ watt.	ND-29267
R-20	Same as R-16	
R-21	RESISTOR, VARIABLE: wire-wound; 4,000 ohms; ±20%; 1½ watts.	153014
R-22	Same as R-21	
R-23	RESISTOR, FIXED, COMPOSITION: 8,500 ohms ±1% ½ watt.	ND-29266
R-24	RESISTOR, VARIABLE: carbon; 15,000 ohms; ±20%; ½ watt; S-taper.	ND-27790
R-25	RESISTOR, FIXED, COMPOSITION: 7,000 ohms; ±1% ½ watt.	ND-28050
R-26	Same as R-3	
R-27	RESISTOR, FIXED, COMPOSITION: 9 megohms.	ND-28051
S-1	ROTOR ASSEMBLY: range switch.	153022
S-2	ROTOR ASSEMBLY: function switch.	153023
S-3	PUSH BUTTON SWITCH	ND-28546
V-1	TUBE, VACUUM: CK548DX/6418.	ND-27796
W-1	LEAD, TEST: assembled; shielded.	153024
W-2	LEAD, TEST: assembled; black.	70033
BT-1	BATTERY: 1½ volt; Ray-O-Vac no. 2 LP size "D" leakproof.	Ref. only
BT-2	Same as BT-1	
BT-3	BATTERY: 45 volts; with tap at 22.5 v; Burgess Z30 NX.	Ref. only
CR-1	GERMANIUM DIODE: IN 306.	ND-28053
CR-2	Same as CR-1	



R-1	8 MEG
R-2	1 MEG
R-3	600K
R-4	200K
R-5	100K
R-6	60K
R-7	20K
R-8	10K
R-9	6K
R-10	2K
R-11	1K
R-12	1K
R-13	100Ω
R-14	10Ω
R-15	1.83MEG
R-16	33MEG
R-17	33MEG
R-18	5K
R-19	80K
R-20	33MEG
R-21	4K
R-22	4K
R-23	8.5K
R-24	15K
R-25	7K
R-26	600K
R-27	9MEG
R-28	270K
R-29	7K

C-1	.05 MFD
C-2	5-80MMF
C-3	25-280 MMF
C-4	1000 MMF
C-5	.01 MFD
C-6	.5 MFD
C-7	.5 MFD
C-8	.01 MFD
C-9	.01 MFD
C-10	390 MMF
CR-1	CK740
CR-2	CK740

WESTON MODEL 982 VTVM

Figure 15. Model 982 Schematic Diagram

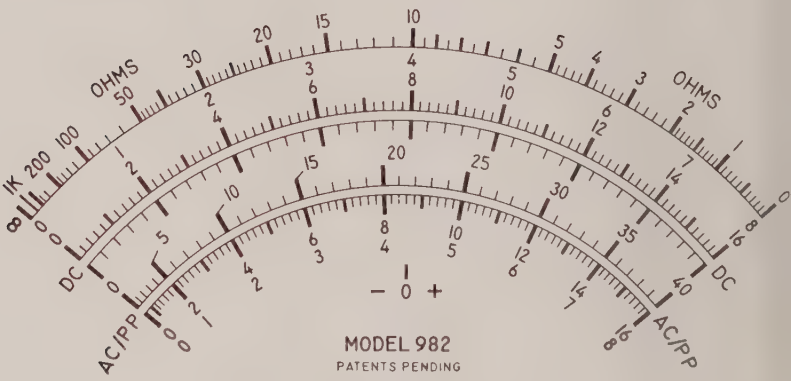


Figure 16. Full Size Scale

NOTES

NOTES

THE WESTON 980 LINE

MODEL 980 ANALYZER

MODEL 981 TUBECHECKER

MODEL 982 VACUUM TUBE VOLTMETER

MODEL 983 OSCILLOSCOPE

MODEL 984 SWEEP GENERATOR

MODEL 985 CALIBRATOR

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